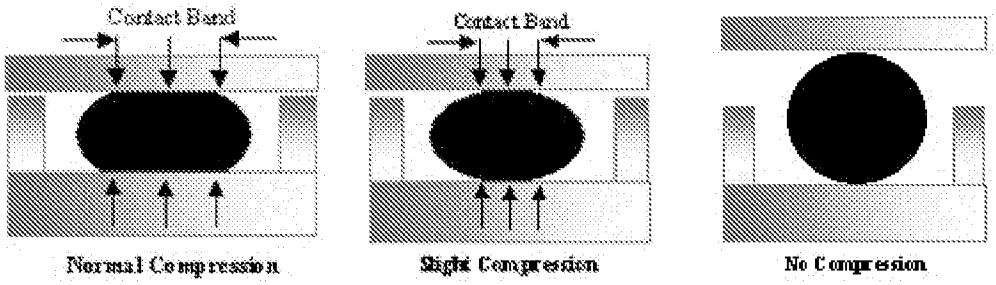
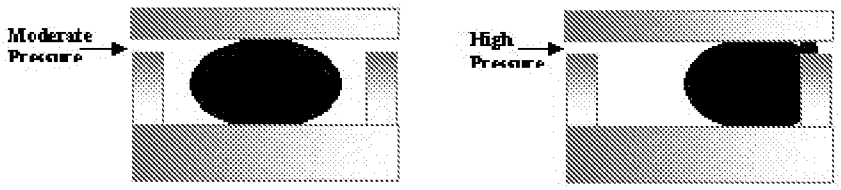
It is a unique characteristics of the elastomer material used in O-rings that makes O-ring such a good seal. The elastomer, a highly viscous, incompressible fluid with high surface tension, has a capacity for remembering its original shape for a long time.

In low-pressure applications (that is, where the confined fluid exerts little or no pressure on the O-ring), the tendency of the elastomer to maintain its original shape creates the seal. As the O-ring is deformed when the mating surfaces are brought together, it exerts a force against the mating surfaces equal to the force it takes to squeeze it. The areas of contacts between the O-ring and the mating surfaces (contact bands) act as a barrier to block the passage of the fluid.

In applications where higher pressure is exerted by the confined fluid, the sealing action of the O-ring caused by the squeeze of its cross-section is augmented by fluid pressure, transmitted through the elastomer. The O-ring is forced to the side of the gland, away from the pressure. As it is pressed against the side, the O-ring, cross section is deformed. The elastomer exerts equal force in all directions and is forced up to the gap between the mating surfaces.



When pressure is released, the O-ring returns to approximately its original installed shape, ready for the next application of pressure. The O-ring is also able to seal in both directions. In a double acting system where the pressure application changes from one side of the O-ring to the other, the O-ring moves, seating itself in the opposite side of the gland.



If pressure exceeds the limits of the O-ring, or if the gap that the O-ring must block is too large, the elastomer will enter the narrow gap between the inner and outer members of the glad. This may result in failure, causing the fluid to leak.